white plates, mainly illustrating spore-forms at the end of the book.

(3) Dr. Stevens's book is a systematic descriptive account of the fungi which cause diseases of economic plants in the United States, and to some extent a companion volume to his "Diseases of Economic Plants," in which the effect of the disease on the host-plant and methods of prevention and cure are described. The term "fungi" is used in a broad sense, and includes myxomycetes and bacteria, as well as true fungi. Under the myxomycetes the author includes the parasitic plasmodiophorales; otherwise this group is a saprophytic one, and innocuous apart from occasional injury owing to the plasmodium overgrowing other plants. The chapter on bacterial disease is also a short one, and the great bulk of the volume deals with parasitic fungi. The arrangement is under the three classes: phycomycetes, ascomycetes, and basidiomycetes, followed by the fungi imperfecti. Under each class keys are given to the orders and families, and class, order and family are concisely described. A key to the genera follows the description of each family. Individual species are described at varying length according to their importance, and many which are not yet known in the United States are briefly mentioned, especially the more important, or those which are likely to invade America. There are text-illustrations of most of the species, and each section is followed by an extensive bibliography; there is also a good glossary at the end of the volume.

MECHANICAL AND CHEMICAL ENGINEERING.

(1) *The Principles of the Application of Power to Road Transport.* By H. E. Wimperis. Pp. xiv+130. (London: Constable and Co., Ltd., 1913.) Price 4*s.* 6*d.* net.

(2) *Farm Gas Engines.* By Prof. C. F. Hirshfeld and T. C. Ulbricht. Pp. vii+239. (New York: John Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1913.) Price 6*s.* 6*d.* net.

(3) *The Diesel or Slow-combustion Engine.* By Prof. G. James Wells and A. J. Wallis-Tayler. Pp. xvi+286. (London: Crosby Lockwood and Son, 1914.) Price 7*s.* 6*d.* net.

(4) *Cement, Concrete, and Bricks.* By Alfred B. Searle. Pp. xi+412. (London: Constable and Co., Ltd., 1913.) Price 10*s.* 6*d.* net.

(1) IN this work Mr. Wimperis has made available in an expanded form the substance of a series of lectures delivered in 1913 at the Finsbury Technical College on the application of power to road transport. In the chapter devoted to the measurement of power, the author describes fully the principles of construction, and the method of using the ingenious accelerometer, which he invented in 1909; by means of this instrument many measurements have now been made of the tractive effort exerted in moving motor-cars and wagons at various speeds, both on the level and on grades, and thus valuable experimental data have been accumulated as a basis for the design of motor vehicles. In a later chapter Mr. Wimperis shows by actual examples how the data obtained by such an instrument and from bench tests of engines may be utilised to design a motor vehicle from prescribed conditions; both motor wagons and touring cars are dealt with, and this chapter should prove of great assistance to designers of motor-cars.

In appendix ii. the author has reprinted the report on the brake horse-power tests carried out at Brooklands in July, 1912, and discusses the values obtained for the brake mean pressure, and the effects of air resistance. Mr. Wimperis has produced a notable little book, of interest to the amateur and of value to the expert.

(2) In this book the authors have attempted the somewhat difficult task of acting as a guide to the farmer who proposes to purchase an internal combustion engine for any power purpose. Though the book is entitled "Farm Gas Engines," it is really mainly concerned with engines using liquid fuel, such as gasoline and kerosene. Of necessity but little theory is given, and the main part of the book is wisely devoted to discussions of the essential points in the design of the working parts of these engines. When a non-expert is considering the suitability of any particular type of engine for his purposes, there are certain details of construction to which he should devote especial attention, and on this matter excellent advice is given in this little book. Though practically only American types of farm engines are discussed by the authors, nevertheless the information and advice given in the chapters devoted to details of engine construction will be found useful by any British farmer who has already obtained, or thinks of obtaining, an internal combustion engine of any type.

(3) It is just twenty years since Dr. Rudolph Diesel published a pamphlet in which he dealt fully with the principles which must govern engine design when the object aimed at is to secure the maximum possible thermal efficiency, and now the Diesel engine has become such a serious rival of the steam engine that it has even been utilised for locomotive work; it is only natural, therefore, that special text-books should be devoted to the theory and construction of the

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Diesel or slow-combustion oil engine, as the authors term it.

The authors, in addition to much original matter, have brought together into convenient form for reference the results of experimental work and the information in regard to constructive details published in the columns of the technical Press of the past ten years, or embodied in the numerous papers read before the leading engineering societies of the world; for this reason alone the book will prove invaluable both to the many engineering firms which now build these engines, and to the engineers who have installed them in power stations, factories, and ships.

The first four chapters deal with the theory of the laws of perfect gases, the work which can be obtained from a given volume of gas when expanding under given conditions, and the application of the well-known entropy diagrams to the study of the internal combustion engine. The next chapter deals with oil fuels suitable for these engines, their physical properties and methods of transport, and storage; in this connection the authors refer to the vast shale deposits in Australia, and to their utilisation for the production of oils for power purposes in that continent. In connection with the question of the cost of power generated by Diesel engines, it may be mentioned that in a test of a 200 b.h.p. two-cylinder four-stroke cycle engine, Mr. Eberle obtained under full load a thermal efficiency of 34·2 per cent. reckoned on the b.h.p., a wonderfully good result. In connection with the testing of Diesel engines the authors give some useful advice as to the care and attention necessary in order to maintain a high state of efficiency.

In view of the importance to designers of Diesel engines of a thorough knowledge of the theory and practice of air compression, the authors have wisely devoted a whole chapter to this subject, and have done their work admirably. The ninth chapter deals with the data and calculations needed in the design of cylinders, crankshafts, valves, flywheels, and reversing gears, while the concluding chapter is devoted to an account, well illustrated, of a number of recently-constructed Diesel engines for all classes of land and marine work; it is in connection with marine work that the greatest advance has taken place in the last two or three years. In an appendix the authors give a most useful abridgment of the principal patents connected with this remarkable motor and its developments.

(4) In this volume, which forms one of a series of text-books on the chemistry of the national industries, Mr. Searle deals with the three important building materials—cements, concrete, and bricks. The importance of a knowledge of chemistry in the manufacture of cement has been long recognised, and to this fact is due the great advance this industry has made during the past twenty years, but it is only recently that the value of chemical research to the brickmaker has been fully realised. In the first five chapters the author deals with cement, most attention being given naturally to Portland cement; he discusses fully the necessary properties of the raw materials, and the various methods of manufacture; Mr. Searle is of opinion that with equal care and skill both the older wet process and the modern dry process produce good results. The chemical and physical changes which occur both in the manufacture and in the setting of cements are most fully and thoroughly discussed, especially the chemical relations between the lime, alumina, and silica. In chapter v. the question of the testing of cement is taken up, the various methods adopted are fully explained, and the importance of cement-sand tests is clearly brought out, the author expressing his opinion that tensile tests of neat cement are largely futile; in dealing with the tests for soundness it is shown that this is a test which it is difficult to carry out with accuracy, and that, as a matter of fact, the majority of the Portland cements now on the market will pass all the ordinary tests for soundness.

Two chapters are devoted to the components of concrete and its preparation, and much excellent practical advice is given; then follows a chapter on reinforced concrete; the author points out that many of the formulæ now used in calculation work contain constants, which in the hands of the experienced man are safely used, but when used by a beginner may lead to serious blunders. The remainder of the book is devoted to brickmaking; the chemical and physical properties of the raw materials are fully discussed, the various processes of manufacture described, and the properties of finished bricks of various classes explained. Mr. Searle has written a thoroughly sound, valuable text-book, which ought to prove of great service to manufacturers, builders, and architects.

T. H. B.

OUR BOOKSHELF.

Lehrbuch der Paläozoologie. Teil ii., Wirbeltiere. By Dr. E. F. Stromer v. Reichenbach. Pp. ix + 32. (Leipzig and Berlin: B. G. Teubner, 1912.) Price 10 marks.

THE second part of Dr. Stromer's text-book of palæozoology deals with the fossil vertebrates in the same concise and philosophical manner as his previous account of the invertebrates. The

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